# **Fact Sheet**

## OPTIMIZATION OF ALTERNATIVE PUMPING SCHEMES FOR MANAGEMENT OF A TCE PLUME

## **PROBLEM**

Use and disposal of trichloroethylene (TCE) at the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), in Hanover, New Hampshire, over a 30-year period has resulted in soil and groundwater contamination. Five production wells are used to extract about 1,000,000 gallons of groundwater per day to provide cooling water for the Laboratory's refrigeration systems. This water is pumped through one of two packed-tower treatment facilities to remove TCE prior to use and subsequent discharge into the Connecticut River. Groundwater throughout the CRREL site is influenced by the extraction process. A pumping strategy is needed to minimize the spread of TCE residual in the saturated soils.

### **SOLUTION**

A combination of conceptual and numerical modeling techniques, in tandem with mathematical optimization techniques, will be employed to establish a pumping strategy that minimizes the spread of TCE. The project will begin with a refinement of the current site conceptual model through additional site characterization and collection of additional data for plume delineation, piezometric head and assignment of initial conditions. Cone penetrometer testing and direct-push small-diameter wells will be employed for this task.

Next, a site conceptual model and key TCE transport parameters will be established and assembled into a concise database compatible with DoD Groundwater Modeling System (GMS) input structure. GMS will be employed to consider various site realization scenarios. The three-dimensional FEMWATER fate and transport model will then be calibrated and verified from data collected in the previous tasks.

Finally, optimization capabilities for GMS will be developed and utilized to determine the best pumping strategy for meeting CRREL's production needs while minimizing the spread of TCE contamination.

This is a cooperative effort among CRREL, the U.S. Army Engineer Waterways Experiment Station (WES), and the Army Environmental Center (AEC).

### **RESULTS**

Field work for additional site characterization is scheduled to begin in May 1995. Four cone penetrometer soundings and installation of nine 1.5-inch-diameter groundwater monitoring wells are planned as part of this task. Installation of dedicated bladder pumps for volatile organic compound (VOC) sampling is also planned at each of the 14 existing 4-inch-diameter groundwater monitoring wells by May 1995.

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